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ADVANCED EXTRAUTERINE PREGNANCY

BY

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"The palpable obscure."—Milton.

Occasional cases of advanced abdominal pregnancy have excited interest and curiosity for many centuries. The rarity of the condition and its inherent drama have led to a large proportion of these cases having been put on record. Ware (1948) found that 311 cases had been reported between 1809 and 1933, and he collected 249 recorded cases between 1933 and 1946. Like early ectopic pregnancies, advanced extrauterine pregnancies are less common in highly organized communities than in underdeveloped ones, and many experienced obstetricians have never encountered the condition. During the first six years after the obstetrics wards at the University College Hospital, Jamaica, opened, 10 extrauterine pregnancies of over 20 weeks' gestation were encountered among 9,303 deliveries, an incidence of 1 in 930. All these cases were cared for by obstetricians who had been trained in other parts of the world and had not been faced with the problems of this condition until they came to Jamaica. It has seemed to us worth while to put our cases on record and to give an account of the difficulties we and our colleagues encountered in the diagnosis and management of this complication of pregnancy.

Points Emerging from the Literature

We do not propose to review the numerous reports of small series and individual cases. The literature includes several major contributions to the knowledge of this difficult condition, and from them several points emerge on which there appears to be general agreement.

1. *Advanced Extrauterine Pregnancy is Dangerous for Both Mother and Child.*—Maternal mortality ranges from nil among the eight cases reported by Yahia and Montgomery (1956) and the 11 cases of Zuspan *et al.* (1957) to 20% and 30% respectively in the series of Cross *et al.* (1951) and Ware (1948). We consider ourselves extremely fortunate to be able to report 10 cases with no maternal death. The outlook for the foetus is even gloomier, but in many reported cases, as in four from our own series, the foetus had died before the diagnosis of extrauterine pregnancy was made. Foetal mortalities ranging from 90% (Charlewood and Culiner, 1955) to 60% (Yahia and Montgomery, 1956) have been reported. Again we have been fortunate that in 5 of our 10 patients the foetus was alive and mature enough to be viable; four of these children survive, and one died of prematurity after a successful delivery.

2. *The Diagnosis is Difficult.*—This often leads to delay, and delay in diagnosis in turn increases the risk, at least to the foetus. As King (1954) has pointed out, the diagnosis is often missed simply because this rare condition is not considered.

3. *The Placenta is a Source of Danger.*—There seems to be a majority opinion in favour of leaving the placenta *in situ*, for fear of provoking uncontrollable haemorrhage, except in occasional cases when it is so situated that it can be removed easily and safely. According to King, the method of dealing with the placenta was considered by Lawson Tait (1888) to be "the crux of the discussion." Tait believed that the placenta should be removed whenever possible and only rarely left *in situ*. Beck (1919) agreed that removal of the placenta was best, but maintained that ligation of the vessels supplying the placental site should precede all attempts at removal; when this could not be achieved the placenta should be left undisturbed. Of more recent writers some advocate removal of the placenta in every possible case (Barrett, 1952; Hibbard, 1957), while a few are convinced that removal of the placenta is so dangerous that it should never be attempted (Cross *et al.*, 1951; Barber and Rathbun, 1958). In each of our cases the placenta has been removed, but in six hysterectomy was necessary in order to do this. The reasons for our course of action are discussed in detail below.

Our 10 cases are summarized in Table I. They are arranged in order of duration of pregnancy. Two were non-viable by dates; three were well past term and the babies were dead when the diagnosis was made. Four of the five remaining infants survive, while one died after delivery. The difficulties encountered in the diagnosis and management of these patients are considered.

Diagnosis

According to King success in diagnosis depends on considering (*a*) the possibility of pregnancy and (*b*) the possibility that the pregnancy is extrauterine. We have been interested in the value of the various points in the history and physical findings that have been described as aiding in this often difficult diagnosis.

History

Three of our 10 cases gave a history of *previous ectopic pregnancy*. In two of these we found that the advanced extrauterine pregnancy arose on the same side as the previous tubal pregnancy, which had been treated by partial salpingectomy.

Much importance has been placed upon the *history of abdominal pain early in pregnancy*. Only two of our patients gave this history, and these happened to be the two in whom the diagnosis was made before the 29th week of pregnancy. The other patients, whose condition was diagnosed later in pregnancy, gave histories of no pain whatsoever or of mild pain gradually increasing after the second half of pregnancy.

The one patient diagnosed at term (Case 7) and two of the three with post-mature dead foetuses gave a convincing history of *spurious labour* at or near term, without previous pain. In Case 8 this helped in reaching a diagnosis.

Vaginal bleeding in early pregnancy is said to be common among cases of extrauterine pregnancy, varying from 25% in King's series to 87% among the cases of Yahia and Montgomery. Only one of our patients (Case 1) gave a history of bleeding in early pregnancy. Bleeding in later pregnancy occurred in three patients (Cases 2, 9, and 10), but in each it was associated with foetal death and probably constituted part of a spurious labour. In the two cases (Nos. 9 and 10) first seen many weeks after the foetus had died it seemed that menstruation had become re-established.

These cases also support the suggestion of Cross *et al.* (1951) that *prolonged retention of a dead foetus* may be an indication of extrauterine pregnancy, and that this becomes practically certain if the pregnancy continues longer than two months after death of the foetus.

Physical Findings

Ease of Palpation of Foetal Parts.—In some cases the foetal parts can be felt much more easily through the thin gestation sac than through the wall of the normally pregnant uterus. In other cases the palpation is unexpectedly difficult, and in reviewing our cases we were impressed by the number in which this was so. Special note was made of the difficulty of palpating foetal parts in 6 of the 10 cases. In three the parts were felt with unusual ease. The remaining case (No. 1) was that of a patient with a pregnancy of 22 weeks. Little could be felt on abdominal palpation, but on vaginal examination the sac containing moving foetal parts could be felt easily through the posterior vaginal fornix. We concluded, therefore, that foetal parts may not be easy to feel in an extrauterine pregnancy, and that it is unwise to rely upon this sign to establish a diagnosis.

Unusual Attitude of Foetus.—The presence of an otherwise unexplained transverse or oblique lie should always arouse suspicion of an extrauterine pregnancy. This sign was found in five of our cases, but in the other five (including the 22-week pregnancy already referred to) the lie of the foetus could not be determined. The sign is not therefore constant or particularly reliable.

Absence of Uterine Contractions.—We do not think that it is possible to be sure that Braxton Hicks contractions are really absent unless the uterus has been palpated continuously for half an hour. This finding was of help in reaching a diagnosis in five of our cases. In the other five the diagnosis was made otherwise, and absence of contractions was not specially noted. The use of oxytocin to provoke contractions in cases of intrauterine pregnancy with a suspiciously lax uterus has been advocated by several writers, including Zuspan *et al.* (1957) We did not employ it in these cases of extrauterine pregnancy, but we were misled by it in the case, recorded later in this paper, of a normal intrauterine pregnancy erroneously diagnosed as being extrauterine.

Palpation of Empty Uterus on Bimanual Examination.—The most important single piece of information to be gained from pelvic examination is the palpation of the uterus apart from the gestation sac. This finding was present in 6 of our 10 patients. In one of the others who had a tubo-ovarian abscess a thorough examination was impossible because of tenderness. Foetal small parts were felt on vaginal examination in four cases—twice through the posterior fornix and twice through the anterior. This finding cannot be considered diagnostic of extrauterine pregnancy unless the empty uterus can be felt without doubt.

State of the Cervix.—Many authors have said there is an appreciable difference between the feel of the cervix in intrauterine and extrauterine pregnancies. Ware (1948) describes the cervix in extrauterine pregnancy as "long, thick, and firm," and says he has seen no case in which "the cervix was soft as it is in an intrauterine pregnancy at term." We do not agree with this.

TABLE I

Case	Age	Previous Obstetrical History	Gestation in Weeks	Site of Placenta	Management	Child				Convalescence
						On Admission	At Birth	Weight (g.)	Subsequent Progress	
1	35	2+1	22	In right broad ligament extending behind caecum and appendix	Total hysterectomy, right salpingo-oophorectomy; appendicectomy	A	SB	—	—	Uneventful
2	39	0+0	28	Behind left broad ligament extending into pouch of Douglas	Subtotal hysterectomy, bilateral salpingo-oophorectomy	D	SB	—	—	,,
3	33	0+0	33	In right broad ligament extending on to uterine fundus	Subtotal hysterectomy, right salpingo-oophorectomy	A	A	1,714	Died at 12 hours	,,
4	28	0+1*	35	In left broad ligament extending on to fundus and sigmoid	Subtotal hysterectomy, left salpingo-oophorectomy	A	A	2,170	Survived	,,
5	34	0+0	36	Left tube and back of left broad ligament	Left salpingo-oophorectomy	A	A	2,126	Survived (mildly spastic)	Mild urinary infection
6	29	2+1*	38	Anterior surface of right broad ligament	Right salpingo-oophorectomy	A	A	2,664	Survived	Mild ileus
7	30	1+0	40	In left broad ligament	Subtotal hysterectomy, left salpingo-oophorectomy	A	A	2,863	,,	Uneventful
8	35	2+1	43	Fundus and right broad ligament	Subtotal hysterectomy, bilateral salpingo-oophorectomy	D	SB	3,231	—	,,
9	24	0+0	46	Posterior surface of uterus and right broad ligament	Right salpingo-oophorectomy	D	SB	2,126	—	,,
10	27	0+1*	51	In right broad ligament	Placenta shelled out of broad ligament	D	SB	N.R.	—	,,

* Ectopic

In all our cases diagnosed before term the state of the cervix was regarded as normal for the duration of pregnancy, and in one (Case 6) the cervix was so soft and boggy that in the absence of an easily felt foetal presenting part the diagnosis of placenta praevia was, for a time, considered. On the other hand, in the two patients whose pregnancies had progressed beyond 44 weeks the cervix appeared to be reverting to its state before pregnancy and was found to be comparatively firm.

Constant Maternal Vascular Souffle.—We think this sign is of great value, and it does not appear to have been described before. The abnormally situated placenta often draws its main blood supply from the ovarian vessels on one or the other side, or (as in Case 6) from very hypertrophied vessels in the round ligament. If the ovarian vessels are dilated and hypertrophied a constant souffle can be heard just medial to the iliac spine on the side on which the placenta is located. In the case where the souffle appeared to arise from vessels along the round ligament the souffle was heard just above the inguinal ligament. This sign seems to be very useful, not only in contributing to the evidence needed to arrive at a diagnosis but also in providing a forewarning of where the placental site may be found, and which vessels may have to be ligated in order to control haemorrhage. This sign was noted in our early cases, and has been searched for in 9 of the 10. It was not looked for in Case 7, which was our first case. Of the other five patients with living foetuses, the sign was found in four (in Cases 1, 3, and 4 over the ovarian vessels, and in Case 6 over the round ligament), and was absent only in Case 5. No souffle has been heard in the four patients first seen after the death of the foetus. It seems reasonable to suppose that the maternal blood flow to the abnormally situated placenta diminishes after the foetus dies. Browne (1954) has demonstrated that the flow of maternal blood to the normal placenta virtually stops after intrauterine death of the foetus, but the mechanism by which this occurs is not understood. We are as yet unable to say how soon after death of the extrauterine foetus the souffle disappears. This souffle, when present, is distinctly louder than a normal uterine souffle, and is audible only over a quite small but constant area of the abdomen, as would be expected, since it usually originates in a single vessel, often the ovarian.

TABLE II

Case No.	Transverse Lie	Foetal Parts Behind Lumbar Spine	Gas Shadows over Foetus	Immobility	Lack of Uterine Outline	Other
3	+ Limbs caudad	–	+	Single set of *x*-ray films	+	
4	+ Limbs cephalad	+	+	+	+	Odd attitude
5	–	–	+	Single set of *x*-ray films	+	Feet in pelvis
6	–	–	+	–	–	
7	+ Limbs caudad	–	+	Single set of *x*-ray films	+	Feet in pelvis
8	,,	–	+	,,	–	Odd attitude. No Spalding
9	,,	No lateral film	–	,,	–	Feet in pelvis. Spalding present
10	+ Limbs cephalad	+	+	+	+	One hand in pelvis. Spalding present

Radiological Evidence

Various "pathognomonic" *x*-ray findings have been described as characteristic of extrauterine pregnancy. No one of these appears to be constantly present or invariably reliable as an aid to diagnosis. In our series radiographs were not taken in Case 2, and in Case 1 they merely confirmed the presence of a 22-week foetus. The findings in the other eight patients are summarized in Table II.

Position of Foetus.—Transverse lie is common, and was found in six of the eight cases. Snow (1952) is quoted by Yahia and Montgomery as saying that the foetus lying transversely inside the uterus usually lies back-downwards with its extremities directed cephalad, but that the extrauterine foetus commonly lies back-uppermost with the extremities directed down toward the maternal pelvis. In four of our cases the foetus was indeed back-uppermost, but in two it was back-downward (Fig. 1), suggesting that there may be exceptions to Snow's rule. In any case, a transverse lie with the back uppermost is not uncommon in cases of placenta praevia.

Attitude of Foetus.—This can best be described as exceedingly odd, though there is no characteristic attitude, as each foetus has to adapt itself as best it can to the space available for it. In some the spine is hyperextended, in others flexed, but almost invariably the head and/or the limbs are at unusual angles to the trunk (Fig. 1). A limb stretched down into the maternal pelvis is especially significant. In three cases a leg and in one case an arm were in this position, and in one of these (Case 7) a hysterogram showed that the foot actually lay below the level of the cervix (Fig. 2).

The appearance of foetal parts overlapping the maternal spine in a lateral view, as described by Weinberg and Sherwin (1956), seems to be a quite reliable indication of extrauterine pregnancy, when present (Fig. 3). We have never seen this in an intrauterine pregnancy. However, this sign was present in only two of our cases, so its absence does not exclude extrauterine pregnancy.

The presence of *gas shadows* over the foetus, or in lateral views anterior to it, seems to us suggestive but not conclusive of extrauterine pregnancy (Fig. 1). We have seen these with an intrauterine pregnancy.

The extrauterine foetus may remain in a singularly constant position and attitude in repeated radiographs.

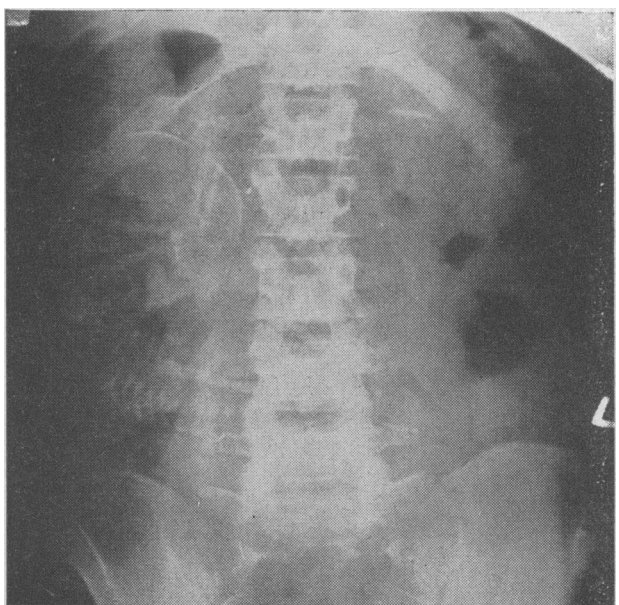

FIG. 1.—A.-P. radiograph of extrauterine pregnancy at 30 weeks (Case 4). This shows the odd foetal attitude and the presence of gas shadows over the upper chest of the foetus. The back is downward—an exception to Snow's rule.

Films were repeated in only three of our cases. In Case 4 the position was constant and the foetus alive; in Case 10 the position was constant but the foetus dead; and in Case 6, with a living foetus, there had been a marked change of position between the two sets of films. The ability of the foetus to move seems to depend on the location of the gestation sac and the amount of liquor amnii.

In three of these cases a soft-tissue shadow was seen which could easily be mistaken for the outline of a normal pregnant uterus. It is hard to say what causes this appearance; possibly in some cases the gestation sac becomes thickened and probably also develops adhesions to omentum. The presence of a "uterine shadow" therefore does not exclude extrauterine pregnancy.

It seems, therefore, that the possibility of extrauterine pregnancy cannot be ruled out even if some or all of the so-called "characteristic" radiological signs of this condition are absent. Many of these signs can be found in cases of intrauterine pregnancy; indeed, the only sign which we think may be conclusive proof of extrauterine pregnancy is overlapping of the maternal spine by foetal parts in a lateral film.

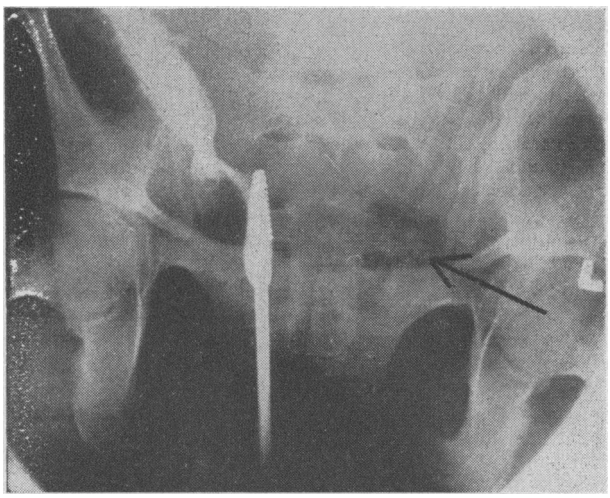

FIG. 2.—Hysterogram showing empty uterine cavity (Case 7). The position of the cervix is shown by the cannula. Foetal feet (arrow) are seen below the level of the cervix.

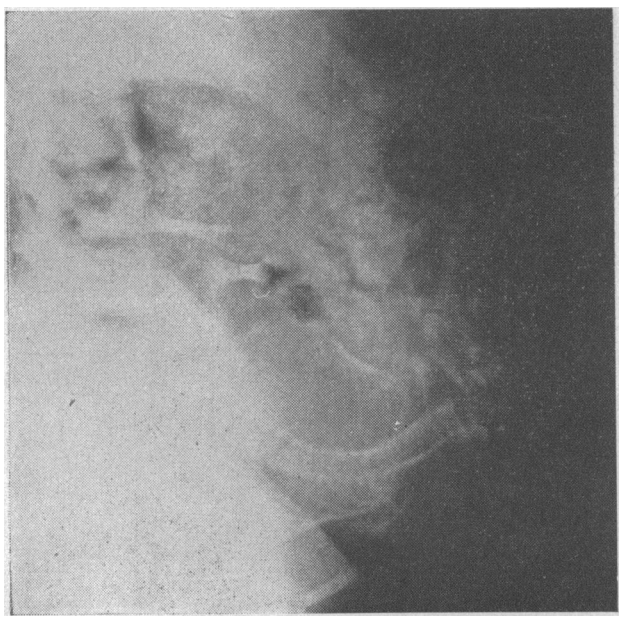

FIG. 3.—Showing foetal parts overlapping the maternal spine. (Lateral view.)

We consider hysterograms to be contraindicated unless the diagnosis of extrauterine pregnancy has already been established beyond doubt, in which case they are of course redundant. We have taken hysterograms in three cases, but solely for teaching purposes.

A short summary of each of the 10 cases follows, to indicate the problems they presented in diagnosis and management.

Case 1

This patient, with active pulmonary tuberculosis, was referred with a diagnosis of menorrhagia due to fibroids. The last normal menstrual period had been 20 weeks previously; but there had been a two-week episode of lower abdominal pain and vaginal bleeding from the 13th to 15th weeks of pregnancy. The true diagnosis was suggested by palpation of a cystic mass behind the uterus and by hearing a constant souffle over the right ovarian vessels, and was confirmed by detecting foetal movement within the sac on vaginal examination.

At laparotomy the gestation sac was found to be within the right broad ligament, burrowing out to the pelvic sidewall, and adherent to caecum and appendix. It derived its blood-supply from the right ovarian and uterine vessels. It was dissected away from the structures on the wall of the pelvis and removed together with the uterus. The left tube and ovary were conserved. Convalescence was uneventful. The foetus was non-viable.

Case 2

This primigravida was uncertain of the date of her last menstrual period, but was admitted to hospital when approximately 28 weeks pregnant. There had been lower abdominal pain since the fourth month of pregnancy and foetal movement had ceased in the sixth month. She was febrile (103.6° F.—39.8° C.) and very ill. An abdominal mass present was thought to be the pregnant uterus, but no foetal parts could be felt and the foetal heart was not heard. There was marked tenderness and rebound tenderness in the right iliac fossa. Laparotomy was undertaken on a tentative diagnosis of either appendiceal or tubo-ovarian abscess together with a dead 28-week intrauterine pregnancy.

The gestation sac was on the left side, the placenta being attached to the back of the broad ligament and the side wall and floor of the pouch of Douglas. A large tubo-ovarian abscess was present on the right side. The dead foetus was removed after opening the sac; the uterus was removed together with both adnexa, including the placenta and the abscess. Despite this very major procedure her convalescence was uneventful.

This was the only one of our cases in which the diagnosis of extrauterine pregnancy was not made pre-operatively.

Case 3

This primigravida was seen first at the 30th week of pregnancy. She had no complaints. The uterus was thought to be big for the dates, and hydramnios was suggested. *X*-ray examination showed a transverse lie of the foetus, back uppermost, and the report stated: "The uterus is large relative to foetal development, consistent with a myoma below the foetus." She was admitted in the 33rd week because of anaemia and a persistent transverse lie.

Two days after admission she complained of slight epigastric pain and slight vaginal bleeding. Foetal parts could easily be felt above the umbilicus; the lie was transverse, with the head on the left. A vague soft mass could be felt above the pubes that later turned out to be the placenta. A loud souffle was heard over the right infundibulo-pelvic ligament. On vaginal examination the cervix was long and soft and the body of the uterus could be felt retroverted and displaced to the left, with a vague cystic mass on the right side of the pelvis. Fifteen minutes after the examination the patient said the pain had gone, but she felt that "the baby

had moved to the left side." No change in position could be detected on re-examination, but laparotomy was undertaken at once.

Liquor amnii was found in the peritoneal cavity, and a foot protruded through a rent in the amniotic sac. This was enlarged and the foetus was delivered. The placenta was in the right broad ligament, its maternal surface partly attached to the body of the uterus but in large part covered only by peritoneum. A haematoma developed quickly behind the placenta which rose upward in the abdomen, and the patient's blood-pressure dropped alarmingly. The membranes were opened beside the placenta and blood gushed forth; exploration under the placenta revealed only a few fine stringy adhesions. The bleeding subsided somewhat when the right ovarian vessels were clamped, and was finally controlled by removal of the body of the uterus together with the placenta. The baby weighed 3 lb. 12½ oz. (1,714 g.) but died after 12 hours; post-mortem examination showed atelectasis. The mother's convalescence was uneventful.

Reference is made below to the problem of retroplacental bleeding in pregnancies within the broad ligament. It seems as though only the intra-abdominal and intra-amniotic pressure enable the placenta to retain its tenuous hold on the thin peritoneal covering over its maternal surface, and when the sac is opened and the foetus is removed nothing will then prevent massive retroplacental bleeding.

Case 4

This patient was first seen at the 30th week of pregnancy. Seven weeks before her last menstrual period she had been admitted to another hospital with an ectopic pregnancy, and left salpingo-oophorectomy and appendicectomy had been done. The present pregnancy had been symptomless except for constipation.

The foetus lay transversely, high in the abdomen with the head under the right costal margin. A definite souffle was heard over the left infundibulo-pelvic ligament (which was puzzling, as we thought the pregnancy must have arisen from her remaining *right* tube and ovary). On vaginal examination the uterus was felt, retroverted and pushed down into the pelvis by the gestation sac. *X*-ray films (Fig. 1) confirmed the foetal position and the presence of a soft-tissue mass below it. Since this seemed to be the patient's last chance to have a child, she was kept under observation in hospital until the baby became more mature. Repeat *x*-ray examination a month later showed the position and attitude of the foetus to be quite unchanged.

By the end of the 35th week everyone, including the patient, had become very apprehensive about waiting longer for this "obstetrical time-bomb," and the baby seemed to have grown. At laparotomy, many omental adhesions to the sac were divided, the sac was opened, and the living foetus was delivered. The sac appeared to be within the left broad ligament. The placenta was partly attached to the body of the uterus and partly covered only by peritoneum. Massive bleeding occurred from the latter area; the patient's blood-pressure dropped, but rose again after the left ovarian vessels had been identified and clamped. The sac was freed from small bowel, pelvic colon, and bladder peritoneum; the leaves of the broad ligament were divided close to the side wall of the pelvis, and the body of the uterus was removed with the placenta. The right tube and ovary were grossly normal and were conserved. Six pints (3,400 ml.) of blood was transfused during the operation.

Convalescence was uneventful. The child weighed 4 lb. 12½ oz. (2,170 g.) and progressed well. Lactation was normal.

Case 5

This primigravida was uncertain of her dates, but was probably 30 to 32 weeks pregnant when first seen at the antenatal clinic. She then complained of vague lower abdominal pain during the previous month. One month later she returned, having had more severe abdominal pain for three days, and was admitted with a provisional diagnosis of a degenerating myoma. Foetal parts were hard to feel. No souffle was heard. *X*-ray examination showed the foetus in the right side of the abdomen presenting as a breech, with the feet hanging into the pelvis. Limbs could be felt easily through the anterior fornix.

At laparotomy the living foetus was found lying free in the peritoneal cavity, which also contained liquor amnii and old blood-clot. The placenta was attached to the region of the left tube and the back of the left broad ligament. The ovary was not found. Severe retroplacental bleeding occurred, but the infundibulo-pelvic and round ligaments were clamped and the placenta could then be removed. The uterus was conserved together with the right adnexa.

The mother's convalescence was uneventful save for a mild urinary infection. The baby weighed 4 lb. 11 oz. (2,126 g.) and made good progress. Lactation was adequate.

The baby was brought back to the hospital at the age of 18 months and was then found to be mildly spastic.

Case 6

This patient had had two normal pregnancies. Two months before her last period a left salpingectomy was done for a tubal ectopic pregnacy. She attended the antenatal clinic regularly from the 27th week of pregnancy onward. At 31 weeks she complained of slight lower abdominal pain, and a little tenderness was found in the left lower quadrant. At 35 weeks the foetus was noted to be difficult to palpate but lying transversely and high in the abdomen. This position was confirmed by *x*-ray examination. At 36 weeks the pain grew worse and the abdomen was more distended, suggesting the diagnosis of hydramnios. The position of the foetus was observed to change. A loud souffle was heard over the right inguinal ligament. No Braxton Hicks contractions could be felt. Examination under anaesthesia confirmed that the uterus could be felt below the gestation sac. A sound passed for 4 in. (10 cm.) into its cavity. Immediate laparotomy was performed.

The sac was opened and a living foetus was delivered. The placenta was attached mainly to the anterior surface of the right broad ligament, securing its blood supply from the right ovarian vessels and grossly hypertrophied vessels in the round ligament. When the placenta was lifted out of the wound these formed an immensely vascular pedicle, which was compressed digitally to control bleeding until the vessels could be identified and clamped. The right tube and ovary could not be identified and were presumably removed with the placenta. The left adnexa were absent. On cleaning out the peritoneal cavity a few small old blood-clots were found, so presumably there had been earlier bleeding from the placental site, which may have explained the recent pain.

The mother's convalescence was complicated by mild ileus. The child, a female, weighed 5 lb. 14 oz. (2,664 g.) and it thrived.

Case 7

This patient, the first in our experience, had had a normal pregnancy and delivery seven years previously. She was first seen at the antenatal clinic when she was one day past term. A round firm mass, the foetal head, could be seen and felt just under the abdominal wall above the umbilicus; as she lay on the table it rose above the pregnant abdomen like the dome of St. Paul's Cathedral. The pregnancy had been uneventful. *X*-ray films were taken, confirming the position of the foetal head and showing that a leg stretched low into the pelvis. While the films were being processed the patient disappeared from the clinic.

She returned the next morning to the labour ward in spurious labour. As this was our first case we did not seek a souffle, and no pelvic examination was made, though a hysterogram (Fig. 2) was done before the patient was taken to the operating theatre.

At laparotomy the gestation sac was found to be in the left broad ligament, displacing the uterus forward and to the right. The foetus and meconium-stained liquor could be seen clearly through the membranes. The sac was very mobile and was brought out of the abdomen before it was opened. After the child was delivered the placenta was

found to be within the left broad ligament, with only a few adhesions to the appendices epiploicae of the sigmoid. In this case no retroplacental haemorrhage occurred, but the placenta was nevertheless removed together with the body of the uterus. It seemed to have gained its principal blood-supply from the ovarian vessels.

The mother's convalescence was satisfactory. The child was distorted at birth from the position it had been forced to adopt during growth, but it survived and developed normally. The birth weight was 6 lb. 5 oz. (2,863 g.).

On examination of the specimen the uterine end of the tube could be seen blending with the placental mass. Serial sectioning showed no trace of ovarian tissue. It was presumed that the pregnancy had been primarily tubal, and had ruptured between the layers of the mesosalpinx early in pregnancy and had continued to develop there.

Case 8

This patient gave a history of two previous full-term pregnancies and one abortion. She attended the antenatal clinic from the 19th week of this pregnancy and had passed as normal until the 38th week, after which she defaulted from the clinic. She was admitted with a history of vague abdominal pains at the 43rd week of pregnancy.

The head could be felt just under the abdominal wall, and *x*-ray examination showed a transverse lie with a curious foetal attitude. The foetal heart was silent and no movement was felt. No souffle was heard. The cervix was long and soft, and the uterus could be felt below the gestation sac, anteverted and in the midline.

At laparotomy the intact sac was found to be adherent to omentum and sigmoid. The placenta was attached to the fundus of the uterus. The sac was opened, and after the infant had been delivered the placenta bled very freely. The exact relations were difficult to establish, and in order to control bleeding both infundibulo-pelvic ligaments were clamped. Subtotal hysterectomy and bilateral salpingo-oophorectomy was done. As it turned out, the placenta was more on the right side, and the normal left ovary could have been conserved if its blood-supply had not already been cut off. The absence of a souffle might have suggested that the blood-flow to the placenta had been reduced after the death of the foetus, but at operation this did not appear so. This was the only case in our series with a still-born baby in which the placental haemorrhage was serious.

The mother's convalescence was uneventful. The stillborn baby weighed 7 lb. 2 oz. (3,231 g.). It showed no maceration, and death was presumed to have been recent. Post-mortem examination showed evidence of anoxia.

Case 9

This primigravida was first referred to hospital when the pregnancy had continued to 46 weeks. At the 25th week there had been a four-day episode of abdominal pain, vomiting, and diarrhoea, but no vaginal bleeding. A similar episode accompanied by bleeding "like a normal menstrual period" occurred at the 36th week. After this, foetal movement ceased and there was regression of abdominal and breast enlargement. A further "menstrual period" had occurred during the 45th week of pregnancy.

An abdominal mass reached to the level of the umbilicus. Foetal parts could not be felt, the foetal heart was not heard, and no souffle was detected. The uterus could be distinguished lying in anteversion below the sac, and foetal parts were felt through the posterior fornix. A hysterogram was done, and foetal limbs could be seen in the pelvis.

At laparotomy the uterus was displaced upward and forward by the gestation sac, which occupied the pouch of Douglas and was densely adherent to the right broad ligament and the right pelvic wall. The sac was opened and the foetus removed. The right adnexa and the adherent placenta were removed. The membrane adherent in the pouch of Douglas was left *in situ*. There was very little bleeding. The placenta seemed to have been supplied mainly by the right ovarian vessels.

Convalescence was normal. The grossly macerated foetus weighed 4 lb. 11 oz. (2,126 g.). The placenta showed degenerative changes, including dystrophic calcification.

Case 10

This patient gave a history of salpingectomy for a right tubal pregnancy in 1955, two years previously. She had attended the antenatal clinic at a country hospital and had remained well until the 34th week of pregnancy, when she began to have mild constant left-sided abdominal pain. Foetal movements ceased at the 37th week, and the pain disappeared a week later. The size of the abdomen then became less. In the 48th week of pregnancy there was dark vaginal bleeding for six days. Attempts at induction failed, and the patient was referred to this hospital a week later. The diagnosis of extrauterine pregnancy was not made, and after further unsuccessful attempts at medical induction of labour the patient was sent home to await spontaneous labour.

She returned in the 51st week of pregnancy, having had further vaginal bleeding for three days with intermittent abdominal pain. The foetus could now be felt more easily. No souffle was heard. The cervix was firm and the uterus could be felt distinctly. *X*-ray examination showed a macerated foetus with one arm reaching into the pelvis, and foetal parts overlapping the maternal spine (Fig. 3).

When the abdomen was opened the placenta was found to be in the right broad ligament, displacing the uterus to the left and downward. The left tube and ovary were adherent to the pelvic wall and the sigmoid. The macerated foetus was in the peritoneal cavity; omentum adhered to its head and small bowel to its legs and body. One arm was in the pelvis behind the placenta, and the cord ran across the utero-vesical pouch, lightly adherent to peritoneum. The adhesions were easily separated and the foetus was removed. The placenta was not at all vascular. The round ligament was divided, the anterior leaf of the broad ligament was opened, and the placenta was literally shelled out of the broad ligament without bleeding, even where it had extended to the lateral pelvic wall and up behind the caecum. The right infundibulo-pelvic ligament was ligated.

Convalescence was smooth. Unfortunately, the macerated foetus was not weighed. The placenta was avascular and meaty. The suspensory ligament of the ovary could be identified running into it, but no ovarian tissue was found.

An Incorrect Diagnosis

The accounts of these cases indicate that advanced extrauterine pregnancies may present with a wide variety of symptoms and signs. As our experience has grown, we have developed the "high index of suspicion" advocated by Cross *et al.* (1951) as the most important attribute leading to successful diagnosis of this condition. But the diagnostic signs are fallible, and the high index of suspicion may occasionally lead to an error in diagnosis, as shown by the following case.

Case 11

A woman aged 26 had previously had three normal deliveries and an appendicectomy. She first attended the clinic at the 23rd week of her fourth pregnancy. There had been no pain or bleeding. The abdomen was thought to be a little large for this duration of pregnancy. A small foetus was very easily felt, lying transversely. A souffle was heard in the left iliac fossa, quite constant but not quite so loud as in the cases described previously. The cervix was long and firm, and it was thought that a rather small uterus could be felt below the gestation sac. She was admitted for investigation. No Braxton Hicks contractions could be felt, and no contractions were produced by an intravenous "pitocin" drip (10 units in 500 ml.) at a rate gradually increased to 4 ml. a minute. *X*-ray examination showed the foetus lying transversely, back uppermost, with the limbs stretched down

towards the pelvis. No uterine outline could be seen and there were numerous gas shadows overlying the foetus.

Examination under anaesthesia confirmed the impression of a small uterus below and probably attached to the gestation sac.

The abdomen was opened, and an apparently normal *intra*-uterine pregnancy was found. The foetus occupied the rather lax upper segment, and the lower segment was firm and unexpanded. The abdomen was closed and the pregnancy progressed uneventfully to term.

This has been a salutary experience, but were we now confronted by a similar case we would be strongly inclined to act in the same way, though perhaps we would observe the patient rather longer before deciding upon a laparotomy.

Management

When Should we Operate ?

Most authorities advise laparotomy as soon as the diagnosis is made. Beck (1919) thought the optimal time for intervention was between the sixth and seventh months of pregnancy, and we consider that the diagnosis will seldom be made earlier than that. But what if the foetus is alive ? Beck thought there was little additional risk in delaying operation until the 38th week in the hope of obtaining a live child. Others believe the risks of such delay to be " unpredictable and grave " (Hibbard, 1957), and point out that foetal abnormalities are common—30 to 50% according to Zuspan *et al.* (1957). They therefore conclude that the interests of the baby should be disregarded. Our series, which contained no foetal abnormalities, leads us to agree with Mahfouz (1938) that this possibility should not influence one's decision. When the foetus is alive it seems reasonable to assume that haemorrhage may be more serious near term than in the middle trimester of pregnancy, but we think that the risk of haemorrhage depends more on the location of the placenta than upon its maturity. The decision to delay operation for five weeks in Case 4 resulted in a happy outcome, which more than compensated for the anxious period of waiting.

Our conclusion is that operation may be delayed in some cases until the foetus attains a reasonable size. The patient must remain in hospital. Blood must be kept available for immediate use. Pain may indicate intraperitoneal rupture of the membranes (Cases 3 and 5) or haemorrhage (Case 6), and necessitates immediate operation.

The situation is quite different when the foetus is dead. We know of no way to determine when the placental site has lost its excessive vascularity. Serious bleeding occurred in Case 8, with a foetus quite recently dead, but there was no difficulty in Cases 9 and 10, in which the foetus had been dead for 10 and 14 weeks respectively. These patients came to no harm during the long interval after intra-abdominal death of the foetus, and we suggest that when the foetus has died it may in fact be the safest procedure to wait for six to eight weeks before opening the abdomen, provided no evidence of infection develops meanwhile. It may not be necessary to wait so long. McClure Browne (1959, personal communication) considers that the placental circulation is much reduced within 48 hours after intrauterine death of the foetus, and the same may prove to be true of an extrauterine placenta.

Can we Predict the Site of the Placenta ?

In some cases we think that the discovery of a souffle may help to determine on which side of the pelvis the placenta is situated and which vessels provide its main blood-supply. The importance of this was impressed upon us by those cases (Nos. 3, 4, 6, and 8) in which rapid clamping of the ovarian vessels controlled alarming haemorrhage. Pelvic examination under anaesthesia before laparotomy may also help to establish the placental site. We do not think that ordinary *x*-ray techniques are of much help in locating the placenta, and aortography seems to us much too difficult and dangerous a procedure to employ in these patients.

What Should be Done with the Placenta ?

There is no easy answer to this question. We have been fortunate so far, since in our cases it has been possible to remove the placenta either alone or together with its site of attachment. This seems to be the best thing to do when it is possible, though it necessitated hysterectomy in six of our patients. The fact that five of these were subtotal is an indication of the severity of the bleeding that occurred. Undoubtedly there are cases where removal is impossible, and if there is no bleeding behind the placenta it should then be left strictly alone.

We have, however, been most impressed by the rapidity and volume of retroplacental bleeding in some of our cases. This is particularly serious when the placenta has developed between the layers of the broad ligament. Here all or part of the maternal surface of the placenta is covered only by a thin sheet of peritoneum, and after it has been removed the cotyledons can be seen clearly through the covering membrane. Its attachments are most tenuous, and one wonders why it has not become detached from its site early in pregnancy. Histological studies (see below) suggest that the pool of maternal blood is kept from spreading beyond the edge of the placenta by massive deposits of fibrin. Apart from this fibrin ring around the edge of the placenta, the only factor preventing placental separation seems to be the pressure inside the amniotic sac. When this is released by opening the abdomen and the membranes and removing the foetus, an immediate retroplacental haematoma forms, as was observed in Cases 3, 4, 5, 6, and 8. We cannot explain why this did not happen in Case 7. However, it would obviously be most dangerous to leave such a loosely attached placenta *in situ*.

The only direct reference to this problem that we have been able to find in the literature is the account by Stromme *et al.* (1959) of a case in which development of a haematoma behind part of a placenta attached to the broad ligament compelled them to remove part of the placenta instead of leaving it all *in situ* as they had planned. Care should be taken to open the sac well away from the edge of the placenta in case the latter proves to be firmly attached to some structure which cannot be removed.

Attachment of the Placenta

All the placentae were examined carefully. Three main characteristics were evident on macroscopic examination. (1) The anatomy was greatly distorted. In some cases part of the fallopian tube could be seen leading toward the placental mass. In no case was ovarian tissue identified either macroscopically or in histological sections. (2) There was tremendous hypertrophy of all vessels near the placenta. (3) The placenta itself appeared relatively healthy, and normal in size and shape for the stage of pregnancy.

Numerous sections were studied to try to determine how the extrauterine placenta is attached. Areas of placenta attached to relatively firm structures, such as the fundus of the uterus (Fig. 4), show amazingly little trophoblastic invasion as compared with a normal intrauterine placenta (Fig. 5). The reason for this difference is obscure. Possibly trophoblastic invasion and the development of strong "anchoring villi" depend partly on the presence of a true decidua, and in the absence of this is handicapped. It makes one wonder whether the extrauterine placenta is ever so firmly attached to its site of implantation that it can safely be left to absorb.

Placenta covered only by a layer of peritoneum shows no anchoring villi at all (Fig. 6), and in this case the mechanism by which the maternal blood is kept in the space behind the placenta (in this circumstance a "chorio-peritoneal" rather than chorio-decidual space) is a matter for speculation, as also are the dynamics of the circulation within the space. If, as we have suggested, the placenta is held against its site of attachment by intra-abdominal and intra-amniotic pressure, it follows that this pressure and the pressure of the blood within the space must be very nearly the same; otherwise either the placenta would be forced off its bed or the blood would be prevented from entering the space. How this precarious balance is maintained despite changes produced by straining or by hypertension must be a matter for conjecture.

The extrauterine placenta seems to have a thick ring of fibrin around its margin (Fig. 7), in marked contrast to the normally situated placenta (Fig. 8). Presumably it is this ring which prevents the retroplacental pool of blood from leaking out under the placental margin. How it develops, and how reliable it is as a safeguard against sudden and possibly fatal haemorrhage, are problems which need much more study, but it is noteworthy that Playfair (1893) referred to the exudation of a "plastic material" around the gestation sac caused by the irritation of the ovum.

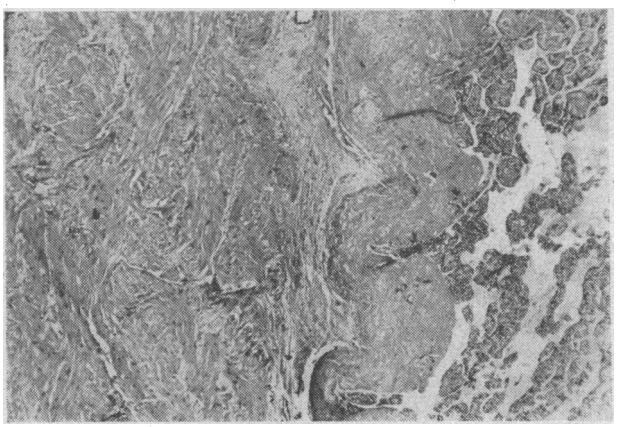

FIG. 4.—Areas of placenta attached to fundus of uterus.

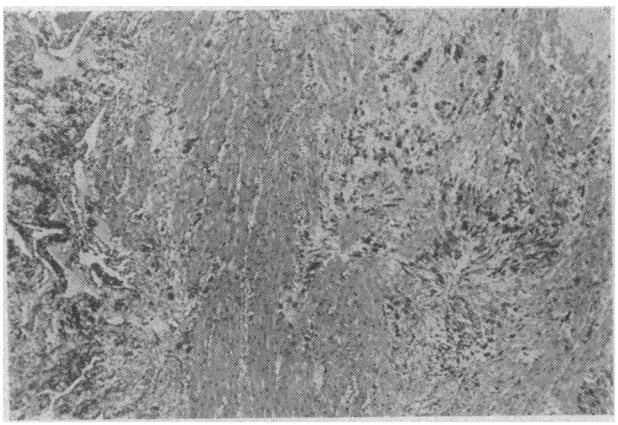

FIG. 5.—Normal uterine placental site.

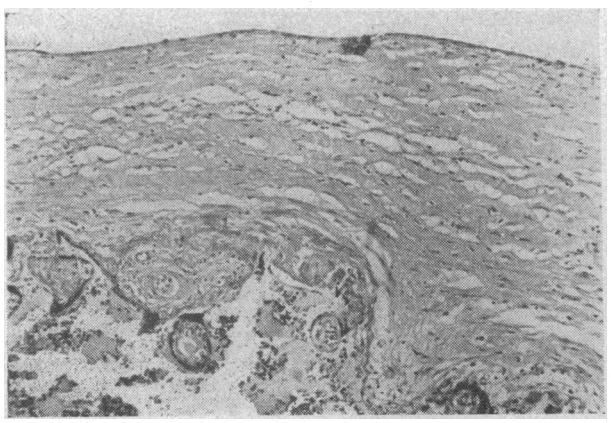

FIG. 6.—Placenta covered only by layer of peritoneum, without anchoring villi.

Summary

Ten cases of advanced extrauterine pregnancy are described. All the mothers and four babies survived.

The difficulties of diagnosis are discussed and are illustrated by the report of an additional case which had many of the characteristics of extrauterine pregnancy but which proved to be normal and intrauterine.

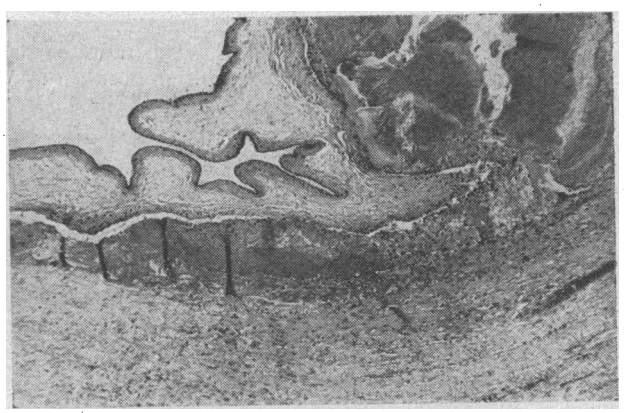

FIG. 7.—Extrauterine placenta apparently with a thick ring of fibrin around its margin, in marked contrast to the normally situated placenta.

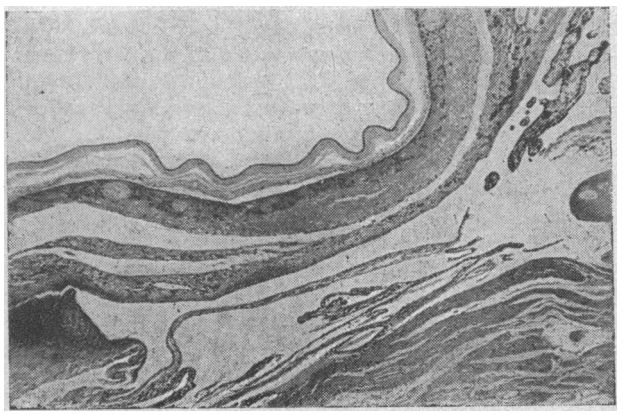

FIG. 8.—The edge of a normally situated placenta.

Attention is directed to the frequent presence of a loud souffle heard over the small area of abdominal wall overlying the hypertrophied vessels supplying the placenta.

While most cases should be dealt with by immediate laparotomy, it may be justifiable on some occasions and with adequate safeguards to allow the pregnancy to continue until the foetus is certainly viable. When the foetus has just died it may be safer to defer operation until the placenta has became avascular.

It is suggested that, whenever possible, the placenta should be removed together with the structures to which it is attached. The special case of the placenta situated within the broad ligament is described. Severe retroplacental bleeding seems inevitable in such circumstances.

A preliminary report of histological studies of the implantation of the extrauterine placenta is included. The problem of how the placenta maintains its precarious attachment until late pregnancy is raised but not solved.

Our thanks are due to our colleagues past and present, notably Professor J. H. M. Pinkerton and Dr. G. T. M. Cummins, who have shared with us the tribulations and rewards of these cases. We are especially indebted to Dr. W. B. Robertson for his invaluable help and advice on the histology.

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"In the years during which I was surgeon to the Albert Dock Hospital (1919 to 1956), I saw many changes in the Health Faculty of my patients. An observer, if he could see and compare the out-patient department of fifty years ago with that of to-day would, I think, be struck first by the revolution in personal cleanliness. In my young days the patient had to be scrubbed before being admitted to bed in the general ward. Their bodies were not just soiled with the dust and sweat of the day's work, but were ingrained with the grime of weeks of neglect. Women, if anything, were worse than men with their greasy straggly rat-tails of hair covered with equally greasy cloth caps. No woman was admitted until her head had been deloused. All patients were verminous." (*The Health of the Dock Worker*, Sir Hugh Griffiths. National Dock Labour Board, Education Booklet No. 2.)

CLINICAL ANALYSIS OF 100 CASES OF SEVERE MEGALOBLASTIC ANAEMIA OF PREGNANCY

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The purpose of this paper is to report on the medical and obstetrical aspects of 100 cases of severe megaloblastic anaemia of pregnancy which have been diagnosed in a six-year period (1953 to 1958 inclusive) at the Rotunda Hospital, Dublin. The findings are compared with those of several similar studies made recently in other centres. The importance of this condition as a cause of maternal and foetal complications is discussed.

Incidence and Degree of Anaemia

It is now realized that megaloblastic anaemia is a comparatively common complication of pregnancy. This series of 100 cases represents an incidence of 1 in 240 confinements (Table I). This figure is slightly lower than the true one because some cases which were delivered on the hospital district were not included owing to incomplete documentation. Higher incidences of this complication have been reported by other workers: Forshaw (1958) found an incidence of 1 in 67 hospital confinements, and Giles and Shuttleworth (1958) found a frequency of megaloblastic anaemia as high as 2.8% of hospital confinements. It seems that the marrow may become megaloblastic in pregnancy with a relatively high haemoglobin (Forshaw *et al.*, 1957), and therefore such patients may in fact be physically well and not in need of treatment. It is emphasized that all cases here reported were clinically anaemic or ill, and that each represented examples of the disease of moderate or severe degree. Each case was a practical problem requiring immediate treatment. Table II shows the degree of anaemia in these cases at the time of diagnosis.

TABLE I.—*Incidence of Megaloblastic Anaemia at Rotunda Hospital*

Year	No.	Year	No.
1953	15	1957	22
1954	13	1958	21
1955	12		
1956	17	Total	100

Incidence approximately 1 in 240 pregnancies. 23 cases occurred in primigravidae.

TABLE II.—*Degree of Anaemia When Diagnosed*

Hb (g.)	No.	Hb (g.)	No.
2·0–2·9	1	6·0–6·9	18
3·0–3·9	5	7·0–7·9	28
4·0–4·9	10	8·0–8·9	15
5·0–5·9	22	9·0–9·9	1

Seasonal Incidence.—In 1957 Thompson, reporting a series of 100 cases from Newcastle taken from the records of over twenty years, found an increased incidence of the disorder during the winter and spring months. He believed that this suggested that dietary deficiency was at least a contributory cause of this disorder. Forshaw (1957) found a similar seasonal incidence amongst his cases, but this was not found by